Category	Question	Response
Disclaimer	How do I know this is accurate? / I don't believe you.	Although we may not be world renowned experts in our fields, we are truly passionate about synthetic biology and the progress possible with this technology. We have read numerous scientific articles, taken classes, and talked to leading researchers in genetic engineering. Our past month has been dedicated to researching superheroes and genetic libraries to tailor a lesson on synthetic biology for you!
Disclaimer	I'm a scientist… Wouldn't _____ fit better for that slide/hero?	We appreciate your suggestion. Would you care to further explain? We are open to your opinions. We are not experts in these genes and superheroes and only have a basic understanding of their functions and origins. We think that superheroes are an interesting twist to learning about synthetic biology and we may have overlooked alternatives when conducting our research for this event.
Disclaimer	Where did these genes come from?	Living organisms from all around the world. We can isolate genes from real organisms and make more in a new host such as E.Coli. Although de novo synthesis of DNA is possible without a template, it is difficult to accurately synthesize an entire gene sequence.
Disclaimer	You're wrong about _____ <superhero fact>, he was actually ___	Sorry, we are not experts in this field but we try to be as accurate as possible. We only have a basic functioning knowledge of superheroes and are presenting the SCIENCE of the superheroes, not exactly the origin stories the comics depict them as. We are completely open to any corrections or fun facts you can tell us about this topic!
Ethics	Is this possible today?	No. Scientific research has been able to isolate genes and sequence genomes from "super-animals," but to genetically engineer an adult with these genes without consequences is impossible as is. It is possible that in the future, techniques in genetic engineering will improve to the point where we will be able to design our own genomes, however, morality and ethics raise questions about engineering humans.

Ethics	What stops you from making superheroes now?	We are currently able to make "super-animals" in a laboratory environment by introducing foreign genes into an embryo, but to do so in a human would mean breaking serious science regulations and ethical codes. Our current goal in science is to improve our understanding of the natural world and design solutions to diseases and worldwide epidemics.
Fact	What is synthetic biology/bioengineering/science/biology?	Synthetic biology is the bridge between engineering and biology. Using engineering principles such as modular parts and abstraction, we can use DNA building blocks to create biological systems or machines. Synthetic biology is based around the principle that we can manipulate existing organisms by using DNA pieces as connectable lego pieces that work together in a system.
Fact	What is cloning? Like Dolly the sheep?	Yes, that's a KIND of cloning, however, in molecular biology we focus on introducing foreign genes into a non-native organism. By cloning, we mean (for example) taking a gene from jellyfish that codes for green fluorescence and putting it into bacterial cells. Since DNA is the universal code for life, we can transplant sequences into different organisms and yield similar results as the ones found in the original organism. Bottom line, cloning is putting foreign genes into a new organism.
Fact	BioBrick Library	The BioBrick library is another goal of synthetic biology. We hope to standardize gene parts for easier construction of biological systems in the future. By creating a library and stock of DNA pieces, we can generate chromosomes similar to using parts to build a machine.
Fact	Chromosome Synthesis	One of the goals of synthetic biology is to synthesize an entirely man-made genome and replace it into a model organism (and still have that organism survive). This has been done to an extent in E. Coli and yeast, even using unnatural and novel DNA base pairings. This would help develop efficient and streamlined methods to engineer organisms.
Fact	I heard mutations are dangerous and scary.	There are various types of mutations and they are not inherently "bad." As Professor X put it so nicely, "mutation is the key to our evolution." Without mutations, genetic diversity would not exist. Everyone would be the same. Therefore, mutations are necessary to progress and evolve.

Fact	What are mutations?	Mutations are genomic alterations that result in changes to DNA, usually from damage or errors in replication. There are different kinds of mutations: such as point mutations, frameshift mutations, entire deletions, and insertions. These can be silent or expressive, depending on the changes to amino acid translation. Severe changes to amino acid coding can lead to irregular protein folding, resulting in different functions and activity levels of a normal protein.
Fact	What is genetic engineering?	Genetic engineering is the purposeful and direct manipulation of an organism's genome using biotechnology. Since DNA is universal, we can isolate useful DNA sequences from one animal, plant, etc and insert it into different organisms. We "cut and paste" these DNA fragments in test tubes using a variety of enzymes. Some examples of genetic engineering are: insulin pharmaceuticals, GMOS, and glowing bacteria.
Fact	Is it possible to get superpowers in the future due to evolution?	It is definitely possible. However, evolution occurs throughout a SPECIES over millions of years, not in an organism. Through natural selection, people with helpful adaptations are able to reproduce and pass their "good genes" to offspring. An example of this is humans developing tolerance to lactose (milk). Drinking milk is a superpower!
Fact	Which of these superheroes are the most plausible?	BATMAN. In terms of superpowered heroes, however, Captain America seems to be the most plausible comic book hero. His increased abilities are not too extreme for a normal human and could be engineered by inserting efficient copies of human genes into his genome. If the "super-serum" were to contain some disarmed virus containing said genes, it would be possible for Captain America to function at above-average strength, speed, intelligence, etc without extreme exertion.